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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,713	12/30/2004	Hidekazu Matsuura	1204.44601X00	7508

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EXAMINER	
MALDONADO, JULIO J	

ART UNIT	PAPER NUMBER
2823	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/519,713	MATSUURA ET AL.	
	Examiner	Art Unit	
	Julio J. Maldonado	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) *1 and 13-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-10,12 and 19-31* is/are rejected.

7)☒ Claim(s) *11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/13/2006 4/9/2007 4/26/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The rejection as set forth in the office action mailed 11/16/2006 is withdrawn in view of the applicants' arguments, filed 03/15/2007.

2. The addition of claims 21-31 is acknowledged.

3. The requirement for restriction for claims 2-12 as set forth in the office action mailed 07/27/2007 is withdrawn in view of applicants' amendments.

4. Claims 1-31 are pending in the application, wherein claims 1 and 13-18 were previously withdrawn from consideration.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2-10, 12 and 19-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (U.S. 6,856,235 B2) in view of Gupen-Shemansky (U.S. 5,268,065, hereinafter Shemansky), Oka et al. (U.S. 6,132,865, hereinafter Oka), Nishinaka et al. (U.S. 6,586,081 B1, hereinafter Nishinaka) and Lin et al. (U.S. 5,273,938, hereinafter Lin).

In reference to claims 2, 3, 7-9, 19-21, 23-27 and 29-31, Fjelstad (Figs.1A-1G) teaches a method of forming a semiconductor package including providing a sacrificial layer (100) made of a conductive metallic material, a polymer material or a combination of both a conductive metallic material and a polymer material; forming wiring circuit

(111, 112) on selected areas of the sacrificial layer (100); electrically connecting a semiconductor die (135) onto the surface of the wiring circuit (111, 112); molding the semiconductor die and the exposed surface of the wiring circuit (111, 112) with a molding compound (140); and removing the sacrificial layer (100) from the wiring circuit (111, 112) and the molding compound (140) (Fjelstad, column 4, line 38 – column 6, line 14).

Fjelstad fails to disclose wherein the sacrificial layer includes an adhesive layer. However, Fukumoto teaches a method of processing semiconductor devices including the steps of adhering a substrate to a sacrificial material, said sacrificial material including an adhesive layer and a support layer (Fukumoto, column 5, lines 36 – 52), wherein said adhesive layer is made of a resin manufactured by graft-copolymerizing unsaturated nitrile, alkyl (meth)acrylate, and monomer compounds, wherein said adhesive can also contain unsaturated carboxylic acid esters such as alkyl acrylate which comprises alkyl group with one to four carbons or alkyl methacrylate, preferably methyl (meth)acrylate and ethyl (meth)acrylate (Fukumoto, column 9, lines 19 – 56), and wherein the elastic modulus of said adhesive layer is of 100 MPa to 1,000 MPa (Fukumoto, column 6, lines 44 – 52); and peeling off the sacrificial layer after processing the substrate (Fukumoto, column 5, lines 19 – 35).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Fjelstad and Fukumoto to enable the formation of the sacrificial layer of Fjelstad according to the teachings of Fukumoto because one of ordinary skill in the art at the time the invention was made would have been motivated to look to alternative

suitable sacrificial layers in Fjelstad and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

The combined teachings of Fjelstad and Fukumoto fail to disclose wherein the adhesive film comprises a support film and a resin layer A formed on one side or both sides of the support film, the 90 degree peel strength between the resin layer A and the metal sheet prior to the processing of the metal sheet laminated with the adhesive film for semiconductor use to give the wiring circuit being 20 N/m or greater at 25°C, and the 90 degree peel strengths, after molding with a molding compound the wiring circuit laminated with the adhesive film for semiconductor use, between the resin layer A and the wiring circuit and between the resin layer A and the molding compound both being 1000 N/m or less at least one point in the temperature range of 0°C to 250°C.

However Oka teaches a method of forming adhering a tape to a semiconductor package, wherein the tape comprises an adhesive layer made of a resin made of an aromatic polyimide (Oka, column 6, lines 28 – 49) formed on a support layer comprising an aromatic polyimide (Oka, column 6, line 50 – column 7, line 5), wherein the glass transition temperature is controlled by controlling the materials used to make the tape (Oka, column 6, lines 38 - 49). Furthermore, Oka discloses that the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 – 48).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Fjelstad and Fukumoto with Oka to enable using an adhesive in the combination of Fjelstad and Fukumoto according to the teachings of Oka because this would result in a sacrificial layer capable of adhering at a

relatively low temperature, without generating gas and causing interfacial separation, with keeping electrical insulating and having sufficient reliability (Oka, column 2, line 64 – column 3, line 3).

The combined teachings of Fjelstad, Fukumoto and Oka fail to expressly teach wherein the adhesive film comprises a support film and a resin layer A formed on one side or both sides of the support film, the 90 degree peel strength between the resin layer A and the metal sheet prior to the processing of the metal sheet laminated with the adhesive film for semiconductor use to give the wiring circuit being 20 N/m or greater at 25°C, and the 90 degree peel strengths, after molding with a molding compound the wiring circuit laminated with the adhesive film for semiconductor use, between the resin layer A and the wiring circuit and between the resin layer A and the molding compound both being 1000 N/m or less at least one point in the temperature range of 0°C to 250°C.

However, Nishinaka in a method of using a tape for semiconductor packages teaches wherein said tape comprises an adhesive, wherein said adhesive comprises an aromatic polyimide, and wherein said adhesive has peel strengths that are temperature sensitive (Nishinaka, column 4, line 43 – column 6, line 47 and column 22, Table 14).

Therefore, in view of the teachings of Oka and Nishinaka related to tailoring the adhesiveness of the tape, in the absence of unexpected results, it would have been obvious to one of ordinary skill in the art at the time the invention was made would have been led to the recited adhesiveness/peel strength for the tape used in the process of Fjelstad and Fukumoto.

The combination of Fjelstad, Fukumoto, Oka and Nishinaka substantially teach all aspects of the invention, but fail to disclose forming the wiring circuits by laminating a metal sheet to the sacrificial layer; and processing the metal sheet to give the wiring circuit. However, Lin (Figs.1-3) teaches a method of forming a semiconductor package including laminating a metal sheet to a sacrificial layer (12); and processing the metal sheet to give a wiring circuit (13) (Lin, column 2, line 64 – column 3, line 24). It would have been within the scope of one of ordinary skill in the art to combine the teachings of Fjelstad, Fukumoto, Oka and Nishinaka with Lin to enable forming the wiring circuits of Fjelstad, Fukumoto, Oka and Nishinaka to be performed according to the teachings of Lin because one of ordinary skill in the art at the time the invention was made would have been motivated to look to alternative suitable methods of forming the wiring circuits of Fjelstad, Fukumoto, Oka and Nishinaka and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

In reference to claim 4, the combination of Fjelstad, Fukumoto, Oka, Nishinaka and Lin teach wherein the adhesive layer has an adjustable glass transition temperature (Oka, column 6, lines 38 - 49) and wherein the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 – 48). The combination of Fjelstad, Fukumoto, Oka, Nishinaka and Lin fail to expressly teach wherein the resin layer A has a glass transition temperature of 100°C to 300°C. However, the selection of the claimed glass transition temperature is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species to obtain a desired adhesiveness to the package. Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to use the prior art of record to arrive at the claimed limitation through routinary experimentation.

In reference to claims 5 and 6, the combined teachings of Fjelstad, Fukumoto, Oka, Nishinaka and Lin substantially teach all aspects of the invention but fail to expressly disclose wherein the adhesive layer has a 5 wt% loss at 300°C or greater, and wherein the adhesive layer has an elastic modulus at 230°C of 1Mpa or greater. However, the same materials would be treated in the same manner and therefore the recited results would be obtained.

In reference to claims 10 and 12, the combined teachings of Fjelstad, Fukumoto, Oka, Nishinaka and Lin teach wherein the sacrificial layer has a thickness of about 100-200μm, but said sacrificial layer could be thicker or thinner (Fjelstad, column 4, lines 38 – 52). The combination of Fjelstad, Fukumoto, Oka, Nishinaka and Lin fail to expressly disclose wherein the ration (A/B) of the thickness (A) of the adhesive layer to the thickness (B) of the support film is 0.5 or less and wherein the thickness of the adhesive layer is 200μm or less. One of ordinary skill in the art would have been led to the recited dimensions through routine experimentation and optimization to obtain a desired sacrificial layer. Applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d

459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). See also MPEP 2144.04(IV)(B).

In reference to claim 22, the combined teachings of Fjelstad, Fukumoto, Oka, Nishinaka and Lin substantially teach all aspects of the invention but fail to disclose wherein the step of peeling off the adhesive film is performed at a temperature in a range of 0°C to 250°C. However, the selection of the claimed temperature is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species that would result in a semiconductor package. Therefore, and in absence of unexpected results, one of ordinary skill in the art at the time the invention was made would have been led to the recited temperature range.

In reference to claim 28, the combined teachings of Fjelstad, Fukumoto, Oka, Nishinaka and Lin substantially teach all aspects of the invention but fail to disclose heating prior to the molding step so as to increase adhesive strength between the resin layer A and the wiring circuit. However, the prior art of record teach controlling the glass transition temperature by controlling the materials used to make the tape (Oka, column 6, lines 38 - 49), wherein the glass transition temperature affects the adhesiveness of the package (Oka, column 2, lines 31 – 48), wherein the adhesive has peel strengths that increase with increasing temperature (Nishinaka, column 4, line 43 – column 6, line 47 and column 22, Table 14). Since the prior art of record requires using

sacrificial layers with high adhesiveness for the purpose of securing the semiconductor package, and furthermore, since the prior art of record teaches that the peel strength of the adhesive layer increases with temperature, one of ordinary skill in the art at the time the invention was made would have been led to the recited limitation through routinary experimentation.

Allowable Subject Matter

7. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments with respect to claims 2-12 and 19-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicants are encouraged, where appropriate, to check Patent Application Information Retrieval (PAIR) (http://portal.uspto.gov/external/portal/pair) which provides applicants direct secure access to their own patent application status information, as well as to general patent information publicly available.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax number for this

group is 571-273-8300. Updates can be found at

http://www.uspto.gov/web/info/2800.htm.

Julio J. Maldonado
Patent Examiner
Art Unit 2823

Julio J. Maldonado
May 11, 2007

GEORGE R. FOURSON
PRIMARY EXAMINER